# AXB-TM5

Television Manager

AXlink Bus Controllers

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Product Information

The AXB-TM5 Television Manager is a microprocessor-based television controller. The AXB-TM5 can be configured as a peripheral on the AXlink. As part of an Axcess Control System, provides media source selection and management via remote control. The AXB-TM5 acts as a local AXlink bus controller and as a receiver for an AMX wireless control panel.

Front Panel

FIG. 1 shows the AXB-TM5 front and rear views.
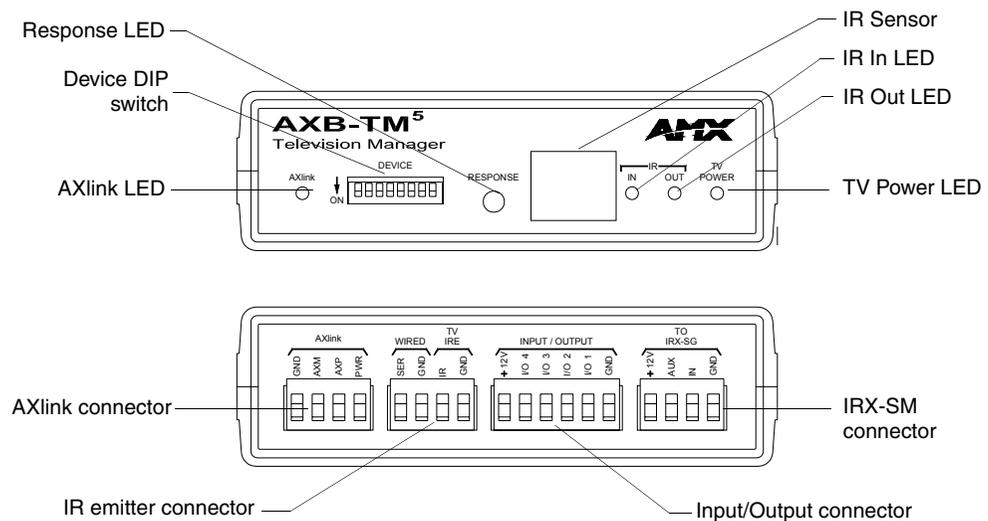
**FIG. 1** AXB-TM5 front and rear views

Specifications

The following table details the specifications for the AXB-TM5.

Specifications	
Dimensions (HWD)	1.50" x 5.09" x 5.27" (3.81 cm x 12.93 cm x 13.39 cm)
Enclosure	High impact black matte plastic
Power Consumption	200 mA @ 12 VDC
Weight	11.0 oz. (312.0 g)

Specifications (Cont.)	
Front Panel Components	
AXlink LED	AXlink LED (green and blinks to indicate AXlink communication activity and power: • Full-Off indicates no power is being received or the controller is not • functioning properly. • One blink per second indicates power is active and AXlink communication is • functioning. • Full-On indicates there is no AXlink control or activity, but power is on.
Device DIP switch	An eight-position DIP switch used to set the AXlink device number for the AXB-TM5.
Response LED (big red)	It can be programmed for flash, full On, and Off modes for control system responses to local input signals. Refer to the *Programming* section on page 9 for programming information.
IR sensor	It receives incoming IR signals from a wireless transmitter. Internal high- and low-frequency (455 kHz or 38 kHz) IR sensors for AMX IR panels.
IR In LED (Red)	Flashes when the AXB-TM5 receives an IR signal from a wireless transmitter.
IR Out LED (Red)	Flashes when the AXB-TM5 IR port sends an IR command to the television receiver.
TV Power LED (Red)	Lights when the CC-XPS External Frequency Television Scan Sensor detects power on a television or monitor as the horizontal scanning frequency from the television receiver.
Rear Panel Components	
AXlink connector	Receives power and information via the AXlink bus and AXlink system controller.
IR Emitter connector	TV sensor connector to detect horizontal scan frequencies from 15 - 65kHz.
Input/Output connector	Four TTL input/output ports.
IRX-SM connector	Allows for up to eight (parallel) IRX-SM connections.
Optional Accessories	• AXB-TM5 control box unit • CC-XPS scanning frequency sensor with cable • CC-IRC IR emitter with cable • 12 VDC power supply

Connection and Wiring

Device DIP Switch

The eight-position Device DIP switch, shown in FIG. 2, sets the AXlink device number. Every device on the bus must have a unique device code. An eight-position DIP switch is used to set the device number for the AXB-TM5. The device number must match the number assigned in the Axcess software program. The AXlink device number range is 1-255 and is sent according to the Device DIP switch positions and their values.

After setting the AXlink device number, remove and reconnect the AXlink connector on the AXB-TM5 to store the new number into memory.

As an example, FIG. 2 is set to 85 (1 + 4 + 16 + 64 = 85), which is the factory default setting.
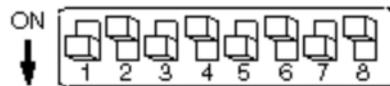
FIG. 2 Device Code DIP switch setting example

The following table describes the Device Code DIP switch settings and its corresponding DIP switch arrangements.

Device DIP switch settings								
Position	1	2	3	4	5	6	7	8
Value	1	2	4	8	16	32	64	128

The device number takes effect only on power-up. If you later change the device number, remove and reconnect the AXlink connector. This enters the new device number into memory.

AMX standard device numbers are assigned as follows:

- Cards are 1 through 25.

- Boxes are 96 through 127.

- Panels are 128 through 255.

Wiring the Rear Panel

Preparing/connecting captive wires

You will need a wire stripper and flat-blade screwdriver to prepare and connect the captive wires.

Never pre-tin wires for compression-type connections.

Do not connect power to the AXB-TM5 until the wiring is complete. If you are using power from AXlink, disconnect the wiring from the control system before wiring the AXB-TM5. If you are using an optional 12 VDC power supply, apply power to the AXB-TM5 only after installation is complete.

WARNING

1. Strip 0.25 inch of wire insulation off all wires.

2. Insert each wire into the appropriate opening on the connector according to the wiring diagrams and connector types described in this section.

3. Do not tighten the screws excessively; doing so may strip the threads and damage the connector.

Wiring Guidelines

The AXB-TM5 requires 12 VDC power to operate properly. The power can be supplied by the AMX system's AXlink cable or with an optional 12 VDC power supply. The maximum wiring distance between the control system and AXB-TM5 is determined by power consumption, supplied voltage, and the wire gauge used for the cable. The following table lists wire sizes and the maximum lengths allowable between the AXB-TM5 and the control system. The maximum wiring lengths are based on a minimum of 13.5 volts available at the control system's power supply.

Wiring Guidelines @ 200 mA	
Wire size	**Maximum wiring length**
18 AWG	586.55 feet (178.78 meters)
20 AWG	371.29 feet (113.17 meters)
22 AWG	231.48 feet (70.56 meters)
24 AWG	145.91 feet (44.47 meters)

If the AXB-TM5 is installed farther away from the control system than recommended in the above table, connect an external 12 VDC power supply to the two-pin PWR connector on the rear panel.

Using the AXlink connector for data and power

To use the AXlink 4-pin connector for data communication and for power supply, the incoming PWR and GND cable from the control system must be connected to the AXlink cable connector going to the control system as sown in the AXlink wiring diagram (FIG. 3).
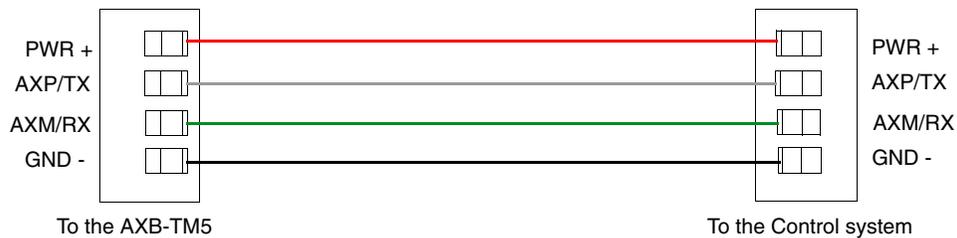
FIG. 3 AXlink connector wiring diagram

CC-IRC emitter wiring connections

FIG. 4 shows how to connect a CC-IRC IR Emitter to the IR Emitter connector on the AXB-TM5.
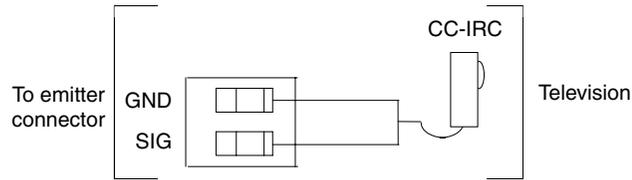

FIG. 4 CC-IRC Emitter wiring connections

IR emitter to device installation

The following steps describe the installation of the IR emitter to the television IR window.

1. Using a sharp edged tool (knife blade, razor knife, etc.), separate the factory-installed shell as shown in FIG. 5.
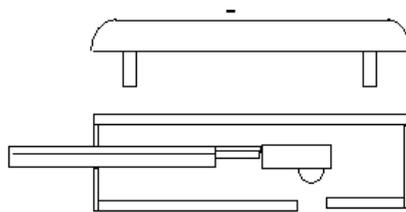

FIG. 5 Removing factory-installed shell

2. Test-fit the IR shield (FIG. 6) to the television's IR window. If necessary, use scissors and trim the shield to fit.
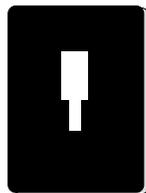

FIG. 6 IR shield

3. Remove the adhesive back covering from the IR shield and place the IR emitter diode into the mirrored recessed area (FIG. 7) of the shield.
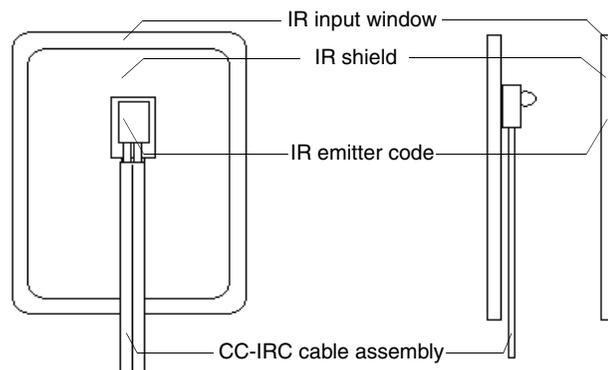

FIG. 7 IR emitter diode installed

For additional information concerning the IR emitter, refer to the IR Sensors and Receivers instruction manual.

4. Attach the IR shield, with IR emitter diode, to the television IR window, ensuring that the IR emitter diode is properly positioned in the television input IR window.

5. Press firmly to activate the pressure-sensitive adhesive of the IR shield.

TV sensor connections

FIG. 8 shows how to connect the CC-XPS to the TV sensor connector to detect horizontal scan frequencies up to 65 kHz.
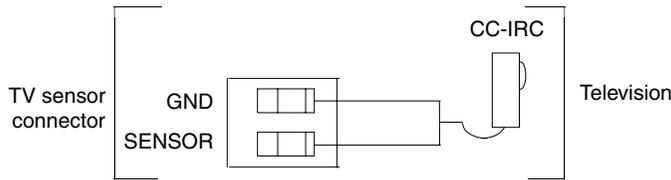
FIG. 8 TV sensor wiring connections

PCS connections

The optional AMX Power Current Sensor (PCS) provides power sensing for equipment that does not generate horizontal scan frequencies. Connect the optional PCS as shown in FIG. 9 for automated power control using Send_Commands PON and POF. A PIN command must be sent to the AXB-TM5 either from terminal mode or from within an Axcess program. If PIN is not used, then the PCS state is received as [TM-Device, 251] for I/O 1.
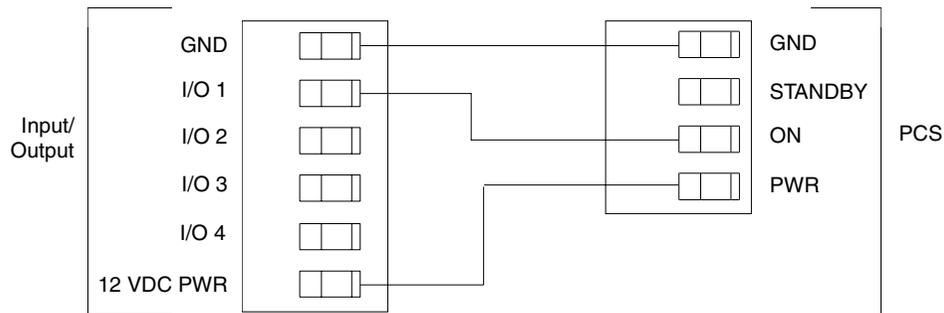
FIG. 9 PCS connections

AXlink data and 12 VDC power supply connections

Connect the control system's AXlink connector to the AXlink connector and an external 12 VDC power supply on the rear panel of the AXB-TM5 as shown in FIG. 10.
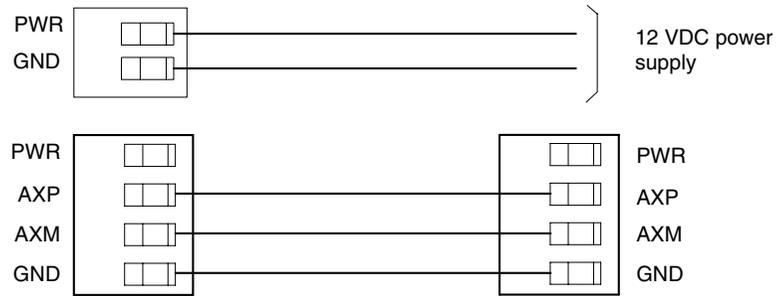
FIG. 10 AXlink 12 VDC power supply wiring example

If you are using power from AXlink, disconnect the wiring from the Axcess Control System before wiring the AXB-TM5.

Use a 12 VDC power supply when the distance between the control system and AXB-TM5 exceeds the limits described in the *Wiring Guidelines* section on page 4. Make sure to connect only the GND wire on the AXlink connector when using a 12 VDC power supply. Do not connect the PWR wire to the AXlink connector's PWR (+) terminal.

IRX-SM connections

Connect one or more (eight maximum in parallel) optional IRX-SM sensors to the AXB-TM5 as shown in FIG. 11. You can also use TX-series wired control panels.
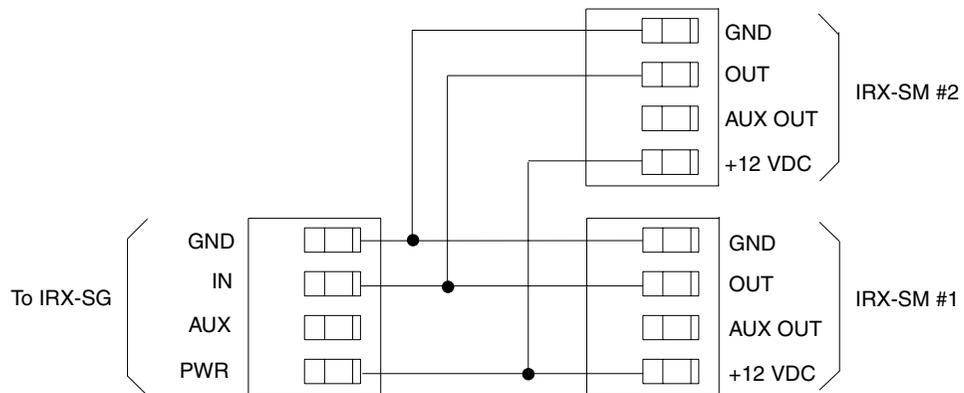
FIG. 11 IRX-SM connections

This configuration is for 40 kHz operation only.

Programming

You can program the AXB-TM5 to perform a wide variety of operations using Axcess Send_Commands. This section describes channel settings, IR functions, and system Send_Commands. Refer to the *AXCESS Programming Guide* for additional programming information.

Channel Setting Commands

The AXB-TM5 use the channel setting commands listed in the following table.

AXB-TM5 Channel Settings	
Channel	**Function**
1	Generates IR/Serial functions 1, else Off
2 - 127	Channels the generate IR code for the corresponding functions
128 - 247	Push and release channels for received IR code
248	A push on this channel indicates a power failure error
249	Response LED blinks when channels 249 and 250 are On
250	Response LED lights when channel is On
251	I/O is On (switch to GND) when channel is On
252	I/O 2 is On (switch to GND) when channel is On
253	I/O 3 is On (switch to GND) when channel is On
254	I/O 4 is On (switch to GND) when channel is On
255	Channel is On if the TV Power Sensor detects a horizontal scan frequency

NOTE *Turning a channel (IR/Serial function) on while another one is currently on will automatically turn the current one off first. Contact closure inputs on I/O 1 through I/O 4 will also generate PUSHes and RELEASEs on channels 251 through 254, respectively.*

Device Assignment

The device assignment must be the same as the device number set on the Device DIP switches (FIG. 2 on page 3).

System Send_Commands

System Send_Commands are stored in the Axcess Control System and direct the AXB-TM5 to perform various operations.

System Send_Commands	
Command	**Description**
'CARON'	Turns the IR carrier On (default).
	Example:
	`SEND_COMMAND AXBTMX,'CARON'`
'CAROFF'	Turns the IR carrier Off.
	Example:
	`SEND_COMMAND AXBTMX,'CAROFF'`
'CH',<TV Channel>	Generates IR digit pulses to select a television channel number. Channels 1-99 pulse as two digits.
	Syntax:
	`"'CH',<TV Channel>"`
	Variables:
	TV Channel = 0 through 199
	Channels 100 and greater, the one-hundredth digit pulses as 127. If IR function 21 (enter) exists, it follows the IR digit pulses. 'CTON' sets the pulse length for each digit and 'CTOF' sets the time between each digit or any after-pulse.
	Example:
	`SEND_COMMAND AXBTMX,"'CH',25"`
	Sets the television connected to channel 25 on the AXB-TM5.
'CTOF',<Time>	Sets the single IR pulses off time between channel digits and IR functions.
	Syntax:
	`"'CTOF',<Time>"`
	Variables:
	Time = 0 through 255 in tenths of a second
	Time is stored in permanent memory. System default is 5 (.5 second). This is the time between digits, or pulses, that are associated with an SP command.
	Example:
	`SEND_COMMAND AXBTMX,"'CTOF',10"`
	Sets the off-time pulse time (delay) to 1 second for the AXB-TM5.
'?CTOF'	Sends the current off-time pulse string 'CTOF,<Time>' to the Control system. The <Time> value is returned in .10 second increments.
	Example:
	`SEND_COMMAND AXBTMX,'?CTOF'`
	Sends the current off-time pulse string from the AXB-TM5 to the Control system in the 'CTOF <Time>' format.

System Send_Commands (Cont.)	
Command	**Description**

'CTON',<Time>	Sends the current on-time pulse string CTON,<Time> to the control system.
	
	Syntax:
	`"'CTON',<Time>"`
	
	Variables:
	Time = 0 through 255 in tenths of a second
	
	Time is stored in permanent memory. System default is 5 (.5 second).
	
	Example:
	`SEND_COMMAND AXBTMX,"'CTON',20"`
	
	Sets the pulse length to 2 seconds on the AXB-TM5.

'?CTON'	Sends the current off-time pulse string 'CTOF,<Time>' to the Control system. The <Time> value is returned in .10 second increments. Example: `SEND_COMMAND AXBTMX,'?CTON'` Sends the current on-time pulse string from the AXB-TM5 to the control system in the 'CTON <Time>' format.

'DC',<IR in>,<IR out>	Sets a direct connection so the 'IR out' (IR function) data transmits while the 'IR in' code is received.
	
	Syntax:
	`"'DC',<IR in>,<IR out>"`
	
	Variables:
	IR in = custom IR functions assigned to hand-held IR transmitting device
	IR out = IR functions
	
	The PUSH and RELEASE for the 'IR in' code is not sent to the AXC-EM. The maximum number of direct connections is 16.
	
	Example:
	`SEND_COMMAND AXBTMX,"'DC',145,24"`
	
	Connects IR-in 145 to IR-out 24 and increases the volume level on the equipment connected to the AXB-TM5.

'DE',<Time>	Set the delay time in .10 second increments for the television power sensor (CC-XPS or PCS) to stabilize before sensing for a status change.
	
	Syntax:
	`"'DE',<Time>"`
	
	Variables:
	Time = 0 through 255
	
	System default time is 10 (1 second).
	
	Example:
	`SEND_COMMAND AXBTMX,"'DE',10"`
	
	Sets the delay time to 1 second for the CC-XPS or PCS connected to the AXB-TM5.

System Send_Commands (Cont.)	
Command	**Description**
'?DE'	Sends the current television power sensor (CC-XPS) delay time string 'DE,<Time>' to the AXC-EM. Set the <Time> value in .10 second increments. Example: `SEND_COMMAND AXBTMX,'?DE'` The AXB-TM5 sends the current television power sensor delay time to the control system in the 'DE <Time>' format.
'DK'	Deletes all direct connections set with the 'DC' command. Example: `SEND_COMMAND AXBTMX,'DK'`
'PIF'	Disables the 'PIN' command. Example: `SEND_COMMAND AXBTMX,'PIF'`
'PIN'	Turns on function that will OR together I/O 1 and frequency sensor to determine actual TV status. I/O 2 will follow 'PON' and 'POF' commands. The status of this function is stored in permanent memory until changed. Example: `SEND_COMMAND AXBTMX,'PIN'`
'POD'	Disables the current 'PON' (power On) or 'POF' (power Off) command settings. Channel 255 changes are enabled. Example: `SEND_COMMAND AXBTMX,'POD'`
'POF'	Sends IR function 28 (if available) to turn device power off. After three attempts, if the CC-XPS (power sensor) still detects a power-on status, the television controller starts processing stored buffer commands. Then, if another IR function 28 fails to turn the television's power off, the television controller sends a 'PUSH' and 'RELEASE' to channel 248 and generates a power failure error. If the device is turned on manually, this command turns television power off unless the television controller receives a 'PON' (power On) or 'POD' (disable 'POF') command. Example: `SEND_COMMAND AXBTMX,'POF'`
'PON'	Sends IR function 27 (if available) to turn device power on. After three attempts, if the power sensor (CC-XPS) still detects a power-off status, the television controller starts processing stored buffer commands. Then, if another IR function 27 fails to turn the television's power on, the television controller sends a 'PUSH' and 'RELEASE' to channel 248 and generates a power failure error. If the device is turned off manually, this command turns television power on unless the television controller receives a 'POF' (power Off) or 'POD' (disable 'PON' command) command. Example: `SEND_COMMAND AXBTMX,'PON'`

System Send_Commands (Cont.)	
Command	**Description**

'PTOF',\<Time>	Sets the IR power-off pulse time after a power-on pulse in increments of .10 seconds.
	
	Syntax:
	`"'PTOF',<Time>"`
	
	Variables:
	Time = 0 through 255
	
	Time is stored in permanent memory. System default is 15 (1.5 seconds).
	
	Example:
	`SEND_COMMAND AXBTMX,"'PTOF',15"`
	
	Sets the power-off pulse time after a power-on pulse to 1.5 seconds for the AXB-TM5.

'?PTOF'	Sends the current IR power pulse off time string 'PTOF, \<Time>' to the control system. Set the \<Time> value in .10 second increments. Example: `SEND_COMMAND AXBTMX,'?PTOF'` Sends the current IR power pulse off time from the AXB-TM5 to the control system in the 'PTOF \<Time>' format.

'PTON',\<Time>	Sets the IR power pulse on time in increments of .10 seconds. Time is stored in permanent memory.
	
	Syntax:
	`"'PTON',<Time>"`
	
	Variables:
	Time = 0 through 255
	
	System default is 5 (.5 second). 'PTON' sets the pulse length for all power pulses, regardless if the pulse is due to a 'PON' or 'POF' command.
	
	Example:
	`SEND_COMMAND AXBTMX,"'PTON',20"`
	
	Sets the IR power pulse on time (delay) to 2 seconds for the AXB-TM5.

'?PTON'	Sends the current IR power pulse on time string 'PTON, \<Time>' to the control system. Set the \<Time> value in .10 second increments. Example: `SEND_COMMAND AXBTMX,'?PTON'` Sends the current IR power pulse on time from the AXB-TM5 to the control system in the 'PTON \<Time>' format.

NOTE

The PTOF time affects how quickly the AXB-TM5 evaluates the power state of a TV. If a TV toggles between on and off when changing the power state, then the 'PTOF' time should be extended. 'PTOF' sets the time in-between each power pulse when the AXB-TM5 is attempting to change the TV's power state (regardless if pulse if On or Off).

System Send_Commands (Cont.)	
Command	**Description**

'RO',<offset>	Sets the offset value subtracted from the IR function before sending the code to the AXC-EM.
	
	Syntax:
	`"'RO',<offset>"`
	
	Variables:
	Offset = 0 through 255
	
	Example:
	`SEND_COMMAND AXBTMX,"'RO',5"`
	
	Subtracts 5 from the incoming IR code number and sends the appropriate IR function from the AXB-TM5 to the control system.

'SP',<IR out>'	Generates a single <IR out> function pulse.
	
	Syntax:
	`"'SP',<IR out>'"`
	
	Variables:
	IR out = 1 through 127.
	The 'CTON' sets pulse length and 'CTOF' sets time between pulses.
	
	Example:
	`SEND_COMMAND AXBTMX,"'SP',25"`
	
	Pulses IR code 25 which decreases the volume level on the equipment connected to the AXB-TM5.

XCH <Channel>	Transmit the IR code in the format set with the XCHM mode command. Syntax: `SEND_COMMAND <DEV>,'XCH <Channel>'` Variable: <Channel> = 0 through 999

System Send_Commands (Cont.)	
Command	**Description**

XCHM
 	
Changes the IR output pattern for the XCH command.
	Syntax:
	`SEND_COMMAND <DEV>,'XCH-<Mode>'`
	Variable:
	  Mode = 0-3
	Example:
	`SEND_COMMAND AXBTMX,'XCH 3'`
	Sets the device's extended channel command to mode 3.
	Mode 0 Example (default): [x] [x] <x> <enter>
	`SEND_COMMAND IR_1, 'XCH 3'`
	Transmits the IR code as 3-enter.
	`SEND_COMMAND IR_1, 'XCH 34'`
	Transmits the IR code as 3-4-enter.
	`SEND_COMMAND IR_1, 'XCH 343'`
	Transmits the IR code as 3-4-3-enter.
	Mode 1 Example: <x> <x> <x> <enter>
	`SEND_COMMAND IR_1, 'XCH 3'`
	Transmits the IR code as 0-0-3-enter.
	`SEND_COMMAND IR_1, 'XCH 34'`
	Transmits the IR code as 0-3-4-enter.
	`SEND_COMMAND IR_1, 'XCH 343'`
	Transmits the IR code as 3-4-3-enter.
	Mode 2 Example: <x> <x> <x>
	`SEND_COMMAND IR_1, 'XCH 3'`
	Transmits the IR code as 0-0-3.
	`SEND_COMMAND IR_1, 'XCH 34'`
	Transmits the IR code as 0-3-4.
	`SEND_COMMAND IR_1, 'XCH 343'`
	Transmits the IR code as 3-4-3.
	Mode 3 Example: [[100][100]…] <x> <x>
	`SEND_COMMAND IR_1, 'XCH 3'`
	Transmits the IR code as 0-3.
	`SEND_COMMAND IR_1, 'XCH 34'`
	Transmits the IR code as 3-4.
	`SEND_COMMAND IR_1, 'XCH 343'`
	Transmits the IR code as 100-100-100-4-3.

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